National Institute of Environmental Health Sciences

Astronomically forced climate change in the Kenyan Rift Valley 2.7-2.55 Ma: Implications for the evolution of early hominin ecosystems

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Abstract:

Global climate change, linked to astronomical forcing factors, has been implicated in faunal evolutionary change in equatorial Africa, including the origin and diversification of hominin lineages. Empirical terrestrial data demonstrating that orbital forcing has a significant effect, or is detectable, at early hominin sites in equatorial continental interiors during the Pliocene, however, remain limited. Sedimentation patterns in the Baringo Basin within the Central Kenyan Rift Valley between ca. 2.7 and 2.55 Ma, controlled by climatic factors, provide a detailed paleoenvironmental record spanning 35 fossil vertebrate localities, including three hominin sites. The succession includes a sequence of diatomites that record rhythmic cycling of major freshwater lake systems consistent with approximately 23-kyr Milankovitch precessional periodicity. The temporal framework of shifting precipitation patterns, relative to Pliocene insolation curves, implicate African monsoonal climatic control and indicate that climatic fluctuations in Rift Valley ecosystems were paced by global climatic change documented in marine cores. These data provide direct evidence of orbitally mediated environmental change at Pliocene Rift Valley hominin fossil localities, providing a unique opportunity to assess the evolutionary effect of short-term climatic flux on late Pliocene East African terrestrial communities.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Human Conflict/Displacement

Geographic Feature:

resource focuses on specific type of geography

Valley

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Kenya

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Historical